

interrelated and tightly interwoven. The common threads between the layers are discretionary and non-discretionary standards (e.g., the Technical Reference Model and Standards Profile).

As illustrated in Figure 1-7, the *FEMA IT Architecture* Model also has five tiers. Each of these five tiers is similar to the NIST model but they have been tailored to be consistent with the terminology defined in OMB guidance. As with the NIST model, IT standards are the threads that bind the tiers of the *FEMA IT Architecture*.

1.12 Major IT Architectural Components

1.12.1 Methodology

This section of the *FEMA IT Architecture* addresses the five major architectural tiers as required by the OMB guidance (See Figure 1-7). To facilitate the development, maintenance, and implementation of the *FEMA IT Architecture*, FEMA initiated development of an Information Technology Architecture Data Base as illustrated in Figure 1-8.

The *FEMA IT Architecture* Data Base depicted in Figure 1-8 provides an automated road map to help address the architectural tiers.

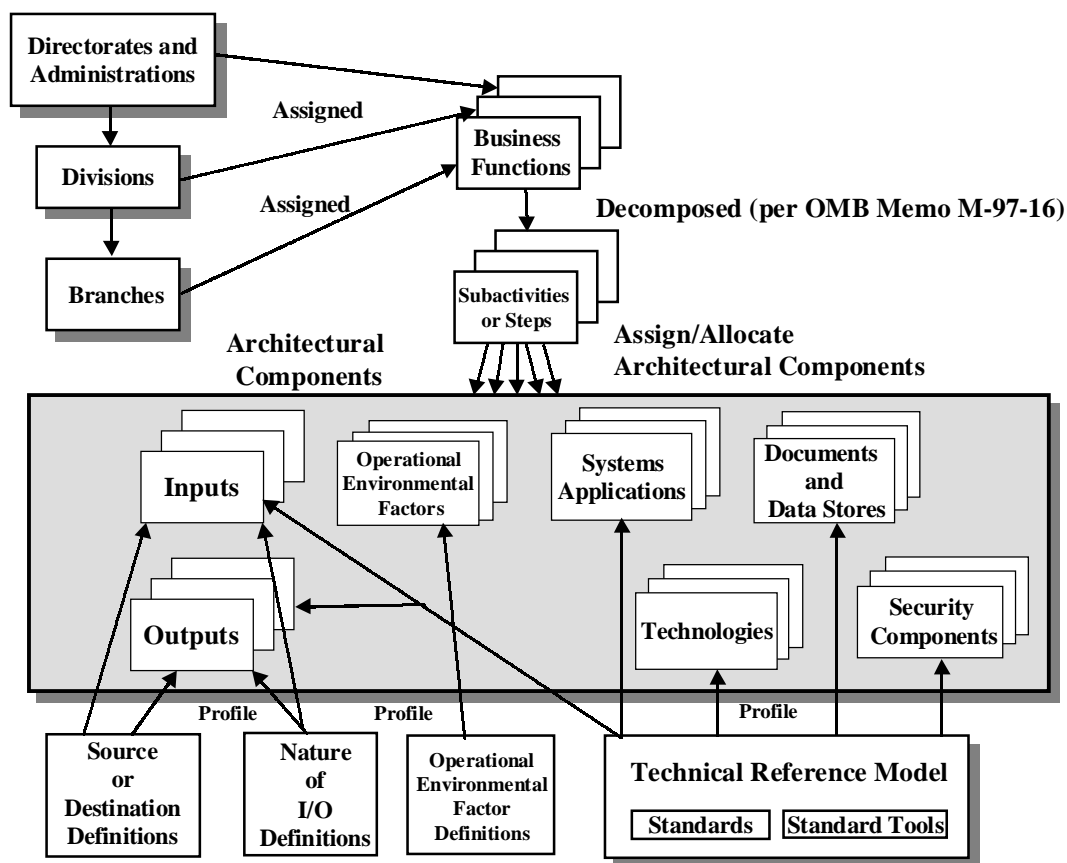


Figure 1-8. Structure of FEMA Information Technology Architecture Data Base

The *FEMA IT Architecture* Data Base provides a framework to help define and allocate reusable IT architectural components to business functions and subactivities. As illustrated in Figure 1-9, it also helped serve as a template for conducting a series of structured discussions on the current and target *FEMA IT Architecture*. Structured discussions were conducted with nearly all of FEMA's organizational elements, including the Regional Offices.

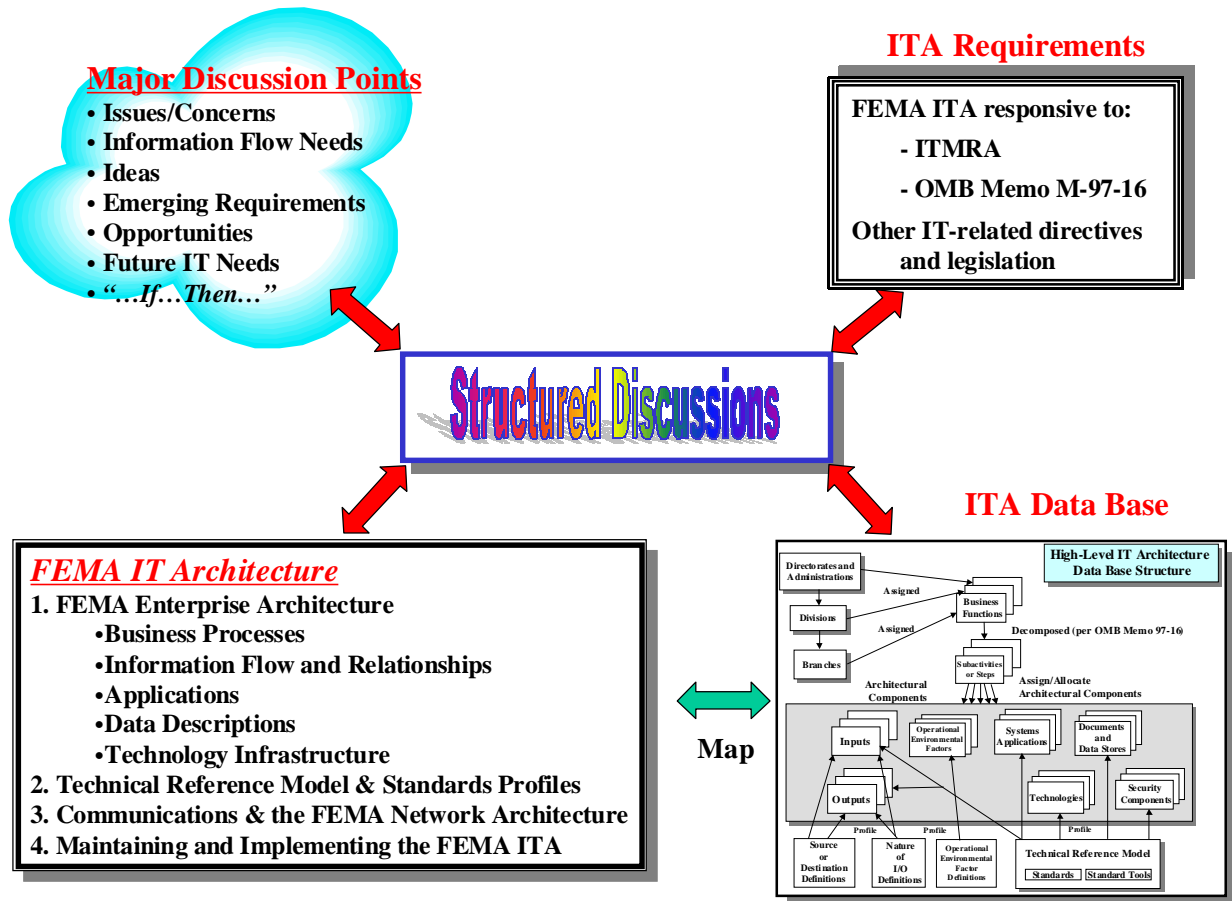


Figure 1-9. Framework for Conducting Structured Discussions with FEMA Organizational Elements

Structured discussions were conducted on the following architectural components:

- **Business functions** (e.g., What are the high-level business functions and how are they allocated or assigned to FEMA organizational elements?)
- **Subactivities** (e.g., What are the important subactivities for the business function(s)?)
- **Inputs and Outputs** (e.g., What are the required internal FEMA and external business partner inputs for a business function or subactivity? What outputs are produced? Who receives and uses the outputs? This discussion addressed the *information flow* architectural level described in OMB guidance.)

- **Operational Environmental Factors** (Which factors apply to the business function or activity? See Appendix J for candidate listing of operational environmental factors.)
- **Systems and Applications** (e.g., Which existing and planned systems and applications apply to, or support, the business function or subactivity and how do they apply?)
- **Documents and Data Stores** (e.g., Which document(s) or data store(s) apply to, or are maintained by, the business function or subactivity? What is the nature of the document or data store? What is the source of information in the document or data store?)
- **Technologies and Security Components** (e.g., Which technologies and security architecture components apply to the business function or subactivity? Which are currently being applied and which are of future interest as potential standardized architectural components?).

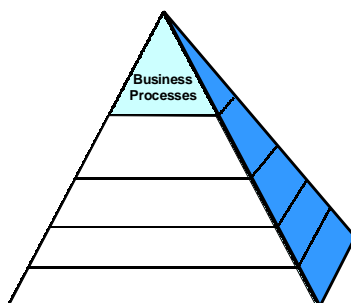
The structured interview process was coordinated through the FEMA Information Resources Board (IRB) to gain increased *buy-in* across FEMA for the final results of the effort. With regard to FEMA's business processes, the goal of this structured interview effort was to:

- Gain an increased and thorough understanding of FEMA's business functions at the senior staff level
- Identify vital information flow requirements needed to support business functions
- Identify senior staff concerns about current and emerging information systems and networks
- Identify new opportunities for streamlining and simplifying the IT systems development process
- Identify needs and requirements for future automation activities
- Identify opportunities for technology insertion
- Identify opportunities for development and standardization of enterprise-wide architectural components that address cross-cutting business needs (such as planning, collaboration, visualization, data capture, interfacing with business partners, reporting, auditing, search and retrieval, etc.).

Due to time constraints for production of this initial *FEMA IT Architecture* document, discussions were only conducted at a high-level and only within FEMA. In the future, FEMA could use the data base framework to conduct structured discussions with FEMA's external business partners. The electronic architecture can help provide a vehicle to agree on open systems standards to achieve interoperability, more streamlined information flow, and improved data and document integrity.

1.12.2 FEMA Business Processes

1.12.2.1 Introduction



This section of the *FEMA IT Architecture* addresses FEMA's core business processes and functions. As noted above, the mission of the Federal Emergency Management Agency is to: ***“Reduce the loss of life and property and protect our institutions from all hazards by leading and supporting the Nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery.”***

FEMA's core business revolves around the four major business processes contained in the FEMA mission statement: *Mitigation, Preparedness, Response, and Recovery*.

While FEMA is a small agency, its information and communications requirements are large and operationally demanding. Development of the *FEMA IT Architecture* must consider:

1. **The large number of subordinate staff business processes and procedures needed to address the four major business functions.** FEMA currently has allocated over 500 business functions to staff elements at the Directorate/Administration, Division, and Branch levels in support of the four high-level business functions. The *FEMA Missions and Functions Manual* provides a comprehensive listing of the assigned missions and business functions down to the FEMA branch and section level. A number of these functions will be addressed and analyzed at a high-level below.
2. **The large number of FEMA external business partners and Federal, State, and local governments that FEMA must interchange information with not only under crisis management circumstances, but also during normal day-to-day operations.** The scope of the FEMA enterprise is large, and IT systems and networks are mission-critical resources. It is conservatively estimated that FEMA interchanges information with well over 200 external organizations ranging from voluntary organizations like the American Red Cross to the National Weather Service. Through FEMA's 10 Regional Offices, FEMA interchanges large volumes of information with State and local governments such as geospatial data (e.g., floodplain maps) and engineering studies and analyses in providing mitigation support. During crises, the Regional Offices are an important focal point for providing rapid response and recovery support. This support is information intense as well as often sensitive and time-critical, raising potential issues associated with security and the need to assure a robust networking and IT systems environment. During a crisis, elected officials, the public as a whole, and the affected population want to know: What is happening?, What are the options?, How can they help?, and When is relief in sight?
3. **The large number and broad scope of documents and data that FEMA either receives or produces for the over 200 external organizations with which FEMA routinely interacts.** Today, much of the information flow is still in paper and some of it must still be physically signed. An appreciable amount of the information is faxed. Increasingly, more and more information is being interchanged in office automation formats and as e-mail, though interoperable standards are sometimes lacking. A large volume of information is also exchanged verbally with increasing trends towards video tele-conferencing and Internet-based approaches for collaboration. Today, comparatively little information is interchanged in direct computer-to-computer interpretable and processible format. New tele-registration and data transfer activities under NEMIS are a notable exception. It is widely recognized across the emergency management community that IT standardization is important to achieve increased efficiencies across the enterprise. It is generally less recognized that such standardization will necessitate some business process re-engineering.
4. **The difficulty in achieving standardization and consensus across the FEMA enterprise on IT and networking solutions.** While everyone wants to achieve improved information flow and interoperability, organizational dynamics and comparatively small IT architectural differences across the enterprise frequently frustrate this effort. For example, minor differences in the compression algorithm for various commercial off the shelf (COTS) e-mail packages may mean that file attachments can not be reliably interchanged and opened across the enterprise much less digitally signed and protected. In addition, FEMA must be leery of

fragile software that simply does not operate as advertised or is laced with *bugs*. This *FEMA IT Architecture* addresses this problem area by establishing FEMA as being proactive to help achieve consensus on information technology and network standards across the enterprise. In fact, FEMA is a major sponsor of the Emergency Information Infrastructure Partnership, which focuses on a dialogue on technology and information needs of the entire emergency management community, and may be a significant contributor to this effort.

1.12.2.2 Analysis of FEMA Core Business Processes and Functions

This section provides a high-level analysis of FEMA's core business processes and functions. The reader is referred to the *FEMA Missions and Functions Manual* for a detailed listing of the missions and business functions assigned down to the branch and section levels. The following are the general conclusions and observations about the core business functions. In particular, the IT-significant features and aspects of the core business functions are addressed.

Mitigation

The *National Mitigation Strategy* is the guiding document in making mitigation become the cornerstone of emergency management at FEMA. An analysis of the *National Mitigation Strategy*, discussions with Mitigation Directorate and Regional Office personnel, and an analysis of the mitigation-related business functions indicate that information technology and communications are vital components of this core business function. Major IT-significant features and aspects of mitigation include the following:

- **Mitigation combines the science of discovery of all hazards, their analysis and risk assessment, with sound engineering practices to develop and implement mitigating measures.** Mitigation is an information intense activity covering all major engineering disciplines and strives to represent knowledge and information. Digital library science with robust and intelligent search and retrieval is a central technology that is needed. Also important are computer-aided engineering models, graphics tools, economic forecasting tools, data mining and trend identification tools, multimedia display formats, text search and retrieval tools, document management systems, and interactive GIS products.
- **Mitigation activities require close collaboration, coordination, and liaison across a broad spectrum of activities at the Federal, State, and local government levels.** In the current environment, much of this collaboration is direct face-to-face through attendance in meetings. In an electronic environment, this requirement places a premium on distributed intelligent collaboration and visualization tools; IT standards to interchange scientific, technical, and engineering information; distributed planning and reporting tools, integrated voice, video, and data applications; and interoperability and connectivity of IT systems and networks (such as Extranets and Virtual Private Networks).
- **Within FEMA, mitigation heavily relies on an enterprise Geographical Information Systems (GIS) to capture, store, and retrieve information on hazards.** The use of GIS places a premium on data capture of very large amounts of geographically-oriented information from all sources including National Technical Means, ensuring data quality, organizing data appropriately on a map, pinpointing the data on the map with an acceptable level of precision and accuracy (necessitating technologies such as Global Positioning System and interferometric techniques), storing it, analyzing it, discovering trends, making it

interactively available in the field, interchanging it with FEMA business partners, and using it in such programs as the National Flood Insurance Program and fire-fighting programs.

- **The Mitigation Directorate is responsible for the establishment, in conjunction with FEMA's Regional Offices, of a nationwide, map-based Hazard Identification and Risk Assessment Program which forms the foundation for FEMA's *National Mitigation Strategy*.** This program supports Federal, State and local emergency management interests through the provision of useful products and information. The GIS initiative to support mitigation is expected to place a significant stress on FEMA's IT systems and supporting network infrastructure in the near future. The growth curve for use of GIS products and services is definitely up. The demand for accurate, interactive, and detailed products is very high not only in other directorates within FEMA, but also with external customers. Mitigation Directorate personnel indicated that significant aspects of their GIS initiative which impact FEMA's IT systems and networking infrastructure include:
 - **A current focus is on map modernization** to speed up the flood mapping process, lower the cost, and increase the accuracy of results.
 - A further emphasis is on **providing more support to local areas** as exemplified by *Project Impact* thus high-bandwidth, interactive GIS product information dissemination will become increasingly more important in the future. Map Service Center activities will be extended to the provision of Flood Insurance Rate Maps as digital raster products over the Internet.
 - The Mitigation Directorate has the requirement to **establish a national inventory of structures and related data sets** needed to support the *National Mitigation Strategy*, the National Flood Insurance Program, Response and Recovery Operations, and a credible national risk assessment and loss program. This is clearly a data intensive effort.
 - There is a **heightened need to use existing and emerging remote sensing assets** to the fullest. The sensing assets that are being considered tend to produce massive amounts of data which must be interchanged and handled within FEMA's IT and network environment (Internet and Intranet); as well as be disseminated in an interactive manner.
 - In that the **information element of elevation is so critical** in many flood mitigation planning and preparation scenarios; the collection, processing, and use of this data element is of high priority. The FEMA Mitigation Directorate has decided to employ and fuse data from Interferometric Synthetic Aperture Radar (IFSAR) and LIght Detection and Ranging (LIDAR) collection systems. This is still an experimental effort. The goal is to achieve a 15 centimeter vertical accuracy on a 1 meter posting. The volume of data expected to be received and processed as part of this collection program is massive.
 - A future objective to which IFSAR and LIDAR are likely to contribute is the configuration of a **single pass, multiple-use collection capability** which can both assist with mitigation and rapid damage assessment (e.g., situation assessment) to support response and recovery. This will place a need for more interactive, near real time access to the data by FEMA teams and partners working in the field.
 - The Mitigation Directorate plans **to evaluate fused IFSAR and LIDAR data to gain additional GIS information** such as terrain elevation, structures characteristics, soil permeability and water retention, ground cover categorization, flow diversion, and other

infrastructure conditions. When combined with other collection programs, the initial data **volume collected is estimated to be on the order of petabytes (e.g., 1,000 terabytes)**. While initial data volume may be on the order of petabytes, after processing, vectorization, and compression, the data volume is likely to be less than 10 terabytes. This will likely stress existing IT systems, storage and archiving capability, collaboration and visualization, and networking particularly if the GIS information is accessed and retrieved in a dynamic and interactive manner (as is envisioned). Additional analysis of the impact of this volume of data on the FEMA network is required.

- **With regard to mitigation, FEMA must manage and coordinate activities covering a number of public laws, directives, and programs** including: the Community Assistance Program, Project Impact, Hazard Mitigation Grant Program authorized by the *Stafford Act*, the Flood Mitigation Grant Program under the *National Flood Insurance Reform Act*, Executive Order 11988 (Floodplain Management), Executive Order 12699 (Seismic Safety of New Federal Buildings), National Earthquake Hazards Reduction Program, the Dam Safety Program, and others. In general, the scope of the mitigation business function with regard to the list of programs calls for **a comprehensive and well integrated, enterprise-wide, IT solution for Grants Management** that will be a part of NEMIS, Version 2 and incorporates:
 - Authoring standards for developing and packaging the grant application which may contain scientific and technical material covering all hazards and disciplines
 - Signature by the originating authority
 - Submission to FEMA (ideally via electronic means)
 - Receipting and date-time stamping of the grant application
 - Workflow within FEMA to process the application
 - Review and collaboration of the grant application (distributed review and collaboration)
 - Tracking, monitoring, and reporting in consonance with new *Government Performance and Results Act (GPRA)* results
 - Engineering and scientific analysis of the results
 - Digital library storage and retrieval of documents and data sets (including multimedia objects which may be attached) associated with the grant program
 - Application of security architecture measures to maintain document and data integrity confidentiality (where required), audit trails, legal and regulatory records, etc., associated with the program or grant
 - Broad information dissemination to get the results out to partners at the State and local level
 - Training associated with the results
 - Financial operations and payment
 - Project closeout.
- **Mitigation must be fully integrated with response and recovery and preparedness activities.** In particular, the Mitigation Directorate identified an emerging need to collect verification and validation information for a disaster. From an IT architecture perspective, this places a premium on the concept of creating information once in its most intelligent form, managing it effectively across its life-cycle, and then gaining maximum re-use. With this approach, not only should mitigation activities support response and recovery, R&R operations should provide verification and validation data to guide future mitigation activity. Interoperable and stable document and data standards are necessary to achieve this synergy. The Mitigation Directorate is responsible for development and integration of the Mitigation Response into the *Federal Response Plan*.

- **The Mitigation Directorate reported that they are actively supporting the Response and Recovery Directorate in developing Emergency Information Requirements for various disasters.** Hurricane information reporting requirements have been developed in draft form and are under evaluation and review. This effort is currently looking at 10 different hazards, 15 different time periods, and 67 different information categories. This effort is also developing accuracy requirements for the reported information. Formats for data interchange are also under consideration and development. From an IT perspective, IT systems within FEMA will need to capture, maintain, and process this information, some of which is expected to be large in volume.
- **Mitigation also advise national model building code organizations, national planning groups, engineering and scientific communities and industry,** on program policy involving mitigation standards and techniques. The Mitigation Directorate coordinates the development and advancement of technical (construction-related) standards and guidance with Federal and State agencies, international activities, State building code authorities, construction organizations, and various testing groups. The Mitigation Directorate has similar requirements for interchange of scientific, technical, graphical, mathematical, and engineering information covering all hazards including: chemical, biological, radiological, and all natural disasters. One of the major goals and objectives of the FEMA Technical Reference Model is to promote open systems standards and consensus on preferred approaches to interchange this type of technical and engineering information.
- **Training, workshops, and seminars are an important component of mitigation business functions and activities,** thereby establishing a potential need for distance learning, multimedia presentations, and distributed collaboration and visualization technologies covering integrated voice, video, and data applications. It is hoped that such technologies will afford cost-benefits in the future. These technologies will need to be fully integrated with preparedness, training, and exercise support.

Preparedness, Training, and Exercise (PT&E) Support

Discussions with PT&E Directorate and Regional personnel and an analysis of PT&E-related business functions indicate that information technology and communications are also vital components of this core business function. Major IT-significant features and aspects of preparedness, training, and exercise support include the following:

- **PT&E provides the leadership, policy, financial and technical assistance, training, readiness, and exercise support to strengthen (1) community and Tribal readiness through preparedness and (2) the professional infrastructure of trained and tested emergency workers, community leaders, and public citizens who can prepare for disasters, mitigate against disasters, respond to a community's needs after a disaster, and launch an effective recovery effort.** As is the case with mitigation, PT&E is an information intense activity; with the added dimension to incorporate robust and timely communications to support planning, control, and operations of exercises and various training events. A great deal of interaction with State and local governments is necessary to assist in planning and preparing for emergencies. This role is expected to expand as technology provides better means of communication and interaction over distance. Closer working relationships are necessary in the areas of planning and guidance procedures and documentation. Today, this is a largely manual process. Central to the business processes of PT&E in a future electronic environment are: distance learning technologies; distributed

modeling and simulation approaches; interactive GIS systems; multimedia approaches; video streaming (live and on-demand); document management system; the Internet for information dissemination; Internet technologies as a tool for distributed planning, collaboration, and visualization; telepresence and virtual reality technologies; and digital library science with robust and intelligent search and retrieval.

- **PT&E activities require close collaboration, coordination, and liaison across a broad spectrum of activities** including the Regions; Federal, State, and local government; voluntary organizations; and FEMA's business partners. In the structured interviews, PT&E Directorate personnel reported that their Directorate routinely communicates with more external agencies and activities than any other FEMA organization. FEMA Regional personnel validated the need for exchange of large amounts of information with the States and local governments as part of infrastructure planning, guidance documents, and exercise planning and operations. Accordingly, PT&E's requirement for real time and near real time collaboration to support exercises and training events is firmly established. This requirement places a premium on distributed intelligent collaboration and visualization tools; IT standards to interchange exercise and training information; distributed exercise planning, reconstruction, and reporting tools; integrated voice, video, and data applications; and interoperability and connectivity of IT systems and networks (such as Extranets and Virtual Private Networks). The PT&E Directorate and the Regions are advocates for establishment of Extranets and Virtual Private Networks. They clearly recognize that security and firewall issues need to be addressed (i.e., as a part of the Critical Infrastructure Protection program). One example PT&E suggested was development of a distance learning server at NETC in cooperation with USFA to serve training and higher education activities for the Training Division and National Fire Academy.
- **In structured discussions, PT&E personnel emphasized the need for interactive flow of ideas and strategies and the need to conduct planning with FEMA's partners/customers.** Such dialogue is essential to success in developing enterprise-wide document and data interchange standards.
- **The PT&E Directorate reported establishment of a new business function capability entitled Capability Assessment for Readiness (CAR).** The intent of this initiative is to develop a core capability for states to assess themselves in 13 major areas. The project will have a data base component and a potential issue is portability to local government. With the *Government Performance and Results Act*, PT&E personnel indicated that performance-based reporting measures are increasingly being levied on the States. Consistent with the direction of the FEMA Technical Reference Model, additional emphasis needs to be placed on defining and achieving consensus on the standards for the required structure and content of the reports.
- **With regard to preparedness, training, and exercise support, FEMA must manage and coordinate activities covering a number of public laws, directives, and programs.** These include: the Community Assistance Program, Radiological Emergency Preparedness Program (REP), Chemical Stockpile Emergency Preparedness Program (CSEPP), Executive Order 12657 (with regard to liaison with the Nuclear Regulatory Commission), post-Cold War programs and projects involving DOD activities, the Performance Partnership Agreement/Cooperative Agreement Process, Project Impact, CERCLA hazardous materials preparedness program (*Comprehensive Environmental, Response, Compensation, and Liability Act*), the Emergency Management Institute (EMI) (e.g., PT&E manages EMI),

Emergency Management Training (EMT) portion of FEMA's Performance Partnership Agreements, MERS training program, community Corrective Action Program, the Legislative Authorities Program (in coordination with the *Defense Production Act*), the Industrial Capacity Assessment Program, and others. In general, the scope of the PT&E and Regional Office business functions with regard to the list of programs calls for a comprehensive and well integrated IT solution for preparedness, training, and exercise support.

- **PT&E develops and manages programs that provide funding assistance to State and local governments** for the design, development, acquisition, operation, and maintenance of emergency management facilities, telecommunications systems and capabilities, participation in exercises, and other emergency equipment capabilities. As with the Mitigation Directorate, the PT&E Directorate and the Regional Offices can benefit from a well-integrated, enterprise-wide Grants Management System, which is planned for NEMIS, Version 2.
- **The PT&E Directorate in close coordination with the Regional Offices has the requirement to improve the ability of Federal departments and agencies, State and local governments, volunteer organizations, and the private sector to respond to emergencies through a comprehensive all-hazard, multi-scenario exercise program.** This includes:
 - Developing exercise packages and scenarios for use by State and local governments
 - Developing, maintaining, and distributing an integrated multi-year exercise calendar
 - Developing procedures for capturing and recording data on the exercises
 - Providing on-scene exercise controllers and observers
 - Providing, or arranging for, financial, logistics, and communications support during the exercise
 - Performing reconstruction and analysis of the exercise and generating after action reports
 - Disseminating the results
 - Developing and managing a Corrective Actions Program and a reporting system.

For real world exercises, the basic IT requirements are to capture the data, maintain it, and provide digital library services for re-use. There is also a vital need to protect and preserve such exercise information. Of potential interest to the PT&E Directorate and the Regional Offices is evaluation of Distributed Interactive Simulation (DIS) technology developed by (and currently used by) DOD which provides a set of protocols enabling an automated and interactive approach to conducting exercises. DIS can integrate data bases such as GIS data bases and provide an virtual or synthetic environment in which all exercise participants can interact in a realistic manner. The costs and benefits of this sort of approach need to be carefully assessed.

- **In structured interviews, PT&E Directorate personnel indicated that they provide facilities management services at Mt. Weather.** Major subactivities include: financial management; administrative support; facility operations and maintenance; warehousing, procurement, and supply management; property management; facility management; and customer care services (e.g., fire protection, medical services, billeting, food service, etc.). The PT&E Directorate is an important user of FACMAN and is working with the ITS Directorate on a new FACMAN that uses the enterprise architecture provided by NEMIS. From an IT perspective, the following were suggested as potential automation initiatives:

- Increased use of digital document libraries and archives to reduce the amount of paper copies
 - Better integration of Time and Attendance Reporting with FACMAN
 - Tighter integration of LIMS and IFMIS with FACMAN
 - Desired ability to archive all facility drawings (estimated at about 10,000 drawings) and make them be accessible for environmental and safety purposes on the Intranet.
 - Increased use of Electronic Data Interchange (EDI) technology for acquisitions with support for digital signatures on electronic documents, drawings, and purchase orders.
- **In structured interviews, PT&E Directorate personnel indicated that they were frequent users of video tele-conferencing capability.** With their mission areas of distributed training, preparedness, and exercise planning and operations, they are also strong proponents for development of integrated voice, video, and data applications, particularly as the FEMA GIS data base is enhanced. They cautioned that bandwidth on existing networks is a concern for high quality video tele-conferencing and will become more of a concern as large data objects are interactively searched, retrieved, and visualized.
 - **Training, workshops, and seminars are a vital component of preparedness.** The Training Division within the PT&E Directorate has the mission to provide national leadership in the development and delivery of training necessary to ensure that individuals and groups with key emergency management responsibilities acquire the requisite skills. This is a large mission area and the reader is encouraged to look at the full scope of subordinate business functions for this Division in the *FEMA Missions and Functions Manual*. The scope of the functions and responsibilities justifies the Training Division's interest in advanced IT technologies in areas as: distance learning; multimedia presentations; distributed collaboration and visualization technologies; integrated voice, video, and data applications; training data bases; digital libraries; electronic methods for registration at conferences; and the use of the Internet.

Response and Recovery (R&R)

The *Federal Response Plan* (FRP) is the guiding document defining FEMA's core business functions for response and recovery. Discussions with R&R Directorate, ITS Directorate, and Regional personnel; and an analysis of R&R-related business functions in the *FEMA Missions and Functions Manual* indicate that information technology and communications are vital components of these core business functions. Please refer to the *FEMA Missions and Functions Manual* for a detailed set of business functions.

Figure 1-10 depicts the major activities defined in the *Federal Response Plan*. Also shown are the 12 Emergency Support Functions (ESFs) and the application of Recovery and Mitigation Programs as part of the response cycle. Response and recovery requires the efforts of State and Federal agencies; private, public, and non-profit organizations; and individuals. Following a Presidential disaster declaration, 28 Federal agencies (led by FEMA) support State and local organizations through one or more of the ESFs. Private and voluntary organizations provide appreciated goods and services to disaster victims.

Under the FRP, R&R efforts are coordinated by FEMA's Regional and Headquarters staff and managed by a Presidentially-appointed Federal Coordinating Officer (FCO). This activity implies a large information flow, which must be supported in a timely and responsive manner by IT systems and networks. The combined *response* efforts assure the rapid provision of safe water, food, shelter, and essentials to disaster victims, and assist in the restoration of basic community

services from sewage treatment to accessible roads. The *recovery* effort aids the long-range restoration of eligible facilities including public roads, bridges, and hospitals. Such efforts support the restoration of economic and community stability.

The R&R Directorate strongly supports recommendations to integrate voice and data networks, to establish Virtual Private Networks (VPNs) with FEMA's business partners, and to move to the ATM protocol. In the structured interviews, R&R indicated that these initiatives will improve the way that FEMA works with other FRP agencies and responds to disasters.

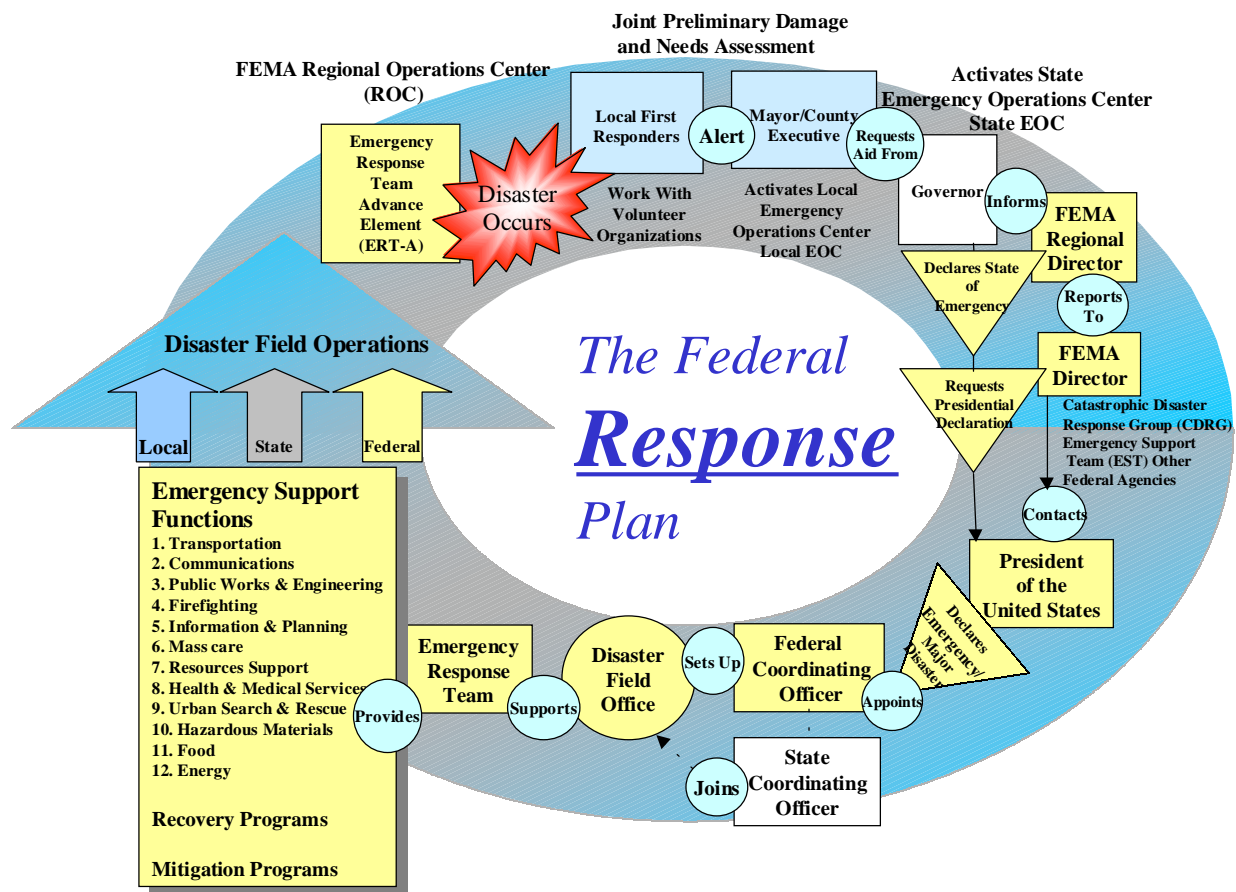


Figure 1-10. Federal Response Plan Activities

Major IT-significant features and aspects of FEMA's response and recovery core business functions include the following:

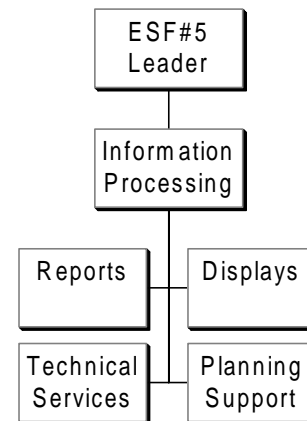
Response Activities:

- **Timely communications and networking are critical to the process for response and recovery during time of a disaster.** In Figure 1-10, essential elements of information (EEI) must flow from box to box. The need for adequate, timely, robust, and reliable communications simply can not be understated and is a major driving factor in the development of this *FEMA IT Architecture*. Connectivity and essential communications must be provisioned, maintained, and assured through the entire chain of command. Requirements for CIP are a vital component of FEMA response activity.

- **Resources are provided by 28 Federal departments and agencies and the American Red Cross.** Essential resources are grouped into 12 Emergency Support Functions (ESFs), each headed by a Primary Agency with other agencies providing support as necessary. Federal disaster recovery programs and mitigation assistance are also implemented and integrated under the FRP. The FRP is linked to emergency plans of departments and agencies. Each of the ESFs have important information flow and underlying data base support requirements and features. For example, ESF#9 *Urban Search and Rescue* reflects the need for FEMA to have ready access to lists of available Search and Rescue assets, with their readiness and logistics considerations. Other ESFs cover important aspects of support for human services (e.g., mass care, health and medical services, food) and infrastructure support (e.g., transportation, public works and engineering, communications, etc.). From an IT perspective, FEMA works closely with its business partners on defining essential elements of information (EEI) for each of the ESFs, the required structure and content of the messages, methods of communication for the data elements, and formats for information exchange.

- **Particular attention is drawn to ESF#5 *Information and Planning*, which is assigned to FEMA. ESF#5 has major implications for design and development of IT systems at FEMA.**

The purpose of ESF#5 is to collect, process and disseminate information about a potential or actual disaster or emergency to facilitate the Federal government response and assistance to an affected State. The scope of the *Information and Planning* ESF is to coordinate the overall information and planning activities at Headquarters, in the Regions, and at field offices in support of Federal response operations. This activity is information intensive, and includes significant and growing support requirements for an integrated, enterprise-wide GIS capability. ESF #5 activities are grouped, as shown in the accompanying figure, among the following major functions underneath the ESF#5 Team Leader:



1. **Information Processing** -- to collect and process essential elements of information from the State, the other ESFs and other sources, disseminate it for use by response operations, and provide it as input for reports, briefings, displays and plans.
2. **Reports** -- to consolidate information into reports and other materials to describe and document overall response activities, and to keep regional and national offices, including heads of departments and agencies, Congress and the White House, informed of the status of the overall response operations.
3. **Displays** -- to maintain displays of pertinent information and facilitate briefings using maps, charts, and status boards in a Situation Room and through other means, such as computer bulletin boards or electronic mail, as available.
4. **Planning Support** -- to consolidate information to support the action planning process initiated by Emergency Response Team (ERT) leadership in the field and the Emergency Support Team (EST) leadership in Headquarters.
5. **Technical Services** -- to provide advice on disaster areas including: aerial reconnaissance, meteorology, structural engineering, seismology, flooding, dam safety, legal and law enforcement issues, national security issues, and other areas requiring specific information to support response efforts.

- **The Assessment and Analysis Branch in the Operations and Planning Division in the R&R Directorate has the mission to develop and maintain an integrated inter-agency situation assessment capability to support response and recovery operations.** In particular, the Assessment and Analysis Branch is responsible for developing and maintaining emergency operating procedures for ESF#5 including the following functions:
 - Information collection and reporting
 - Situation reporting procedures including the production of a national Situation Report (SITREP)
 - Briefing and displays to support emergency operations
 - Use of predictive modeling and GIS support in disaster operations
 - Standard procedures for documenting disaster operations
 - Procedures for development and production of *Action Planning Documents* and *Incident Action Reports*.

The Assessment and Analysis Branch is also responsible for managing the remote sensing program before emergency situations develop and after disaster operations begin. This program includes overhead photography and other sensing, as required. From an IT systems perspective, the Branch has a significant need to create, manage, and use a large volume of material (text and graphics). The Branch can benefit from advanced digital library technology, interactive GIS, and improved and more accurate and timely methods of collecting information in the field (e.g., employment of PCS, laptops, and GPS for field inspectors to pinpoint locations in disaster areas where normal features such as street addresses and other locating features might be destroyed).

- **In general, the Operations and Planning Division within the R&R Directorate has a large and significant requirement for IT systems and telecommunications support. In coordination with PT&E, the Division also supports training exercises, which require a large information flow.** The reader is referred to the *Mission and Functions Document* for a complete listing of business functions for this Division. Nearly all of the assigned business functions are IT systems-significant. Some of the more significant functions for this Division, which need to be supported by IT systems or telecommunications, include:
 - Planning and Coordination Branch
 - Policy and briefings on the FRP
 - Operational planning and response to the consequences of terrorism
 - Point of contact with NS for COOP planning for the R&R Directorate
 - Inter-agency coordination and support of R&R operations.
 - Emergency Services Branch
 - Operations support (including mission assignments and action tracking)
 - EST and ERT operations support
 - Emergency response documentation
 - NEMIS usage and data support (Note: NEMIS has data models for Emergency Coordination (EC) and Emergency Support (ES) that are used by the R&R Directorate).
 - Operations Centers Branch
 - Operations of the NECC, EICC, and the National Warning Center
 - Readiness Team support (including emergency alert and notification procedures).
 - Assessment and Analysis Branch
 - Information and planning (for FRP Annex, EST Handbook Annex, standard operating procedures, etc.)
 - Development of a rapid situation assessment capability

- Community relations regarding R&R operations
 - Disaster reporting requirements
 - Remote sensing and reconnaissance support (see above).
- **Within the R&R Directorate, the Mobile Operations Division manages the MERS (Mobile Emergency Response Support) Detachments and the Mobile Air Transportable Telecommunications System (MATTS) deployments.** MERS Headquarters has Operations, Telecommunications, Logistics, and Administration responsibilities. Individual MERS Detachments are under a MERS Chief and consist of Operations, Telecommunications, and Logistics Branches. MERS detachments are part of FEMA's all-hazard mission response capability. In the immediate aftermath of a disaster, there may be a critical need for communications, information and decision support, operations support, and life support. Support for the MERS detachments tends to be IT systems and communications intensive. An analysis of the MERS detachment business functions indicates a number of processes that need to be supported by IT systems and networking. These processes include:
 - Operations
 - Activity planning and coordination
 - Reports generation
 - Planning support to Regions
 - ESF-5 support to ROC and ERT-A
 - Gathering of information on incidents.
 - Telecommunications
 - Install, operate, and maintain satellite systems; telephone systems; VHF, UHF, and HF radios; cross band radio relays; line-of-sight radios; Recovery Channel/Analog Video Broadcast uplink system; video tele-conferencing system; and LAN and WAN connections.
 - Logistics
 - Operate and maintain: power generation system, water system, fuel system, HVAC system, and report on MERS readiness
 - Maintain MERS vehicles and report on readiness
 - Provide for property accountability (through LIMS).
- **An analysis of the assigned business functions for the Readiness Coordination Division within the R&R Directorate indicates that this Division also has a large and significant requirement for information.** In general, assessment of FEMA's readiness to support response and recovery activities requires that data and information from distributed sources be gathered in a timely manner. The data and information must be critically analyzed to determine readiness measures and capabilities. In an IT systems environment, this requirement places a premium on ability to create, manage, use, and share data in a distributed and secure collaborative fashion, as well as a decision support capability. Some of the more IT significant business functions of the Readiness Coordination Division include:
 - Administrative Team
 - R&R budget formulation and execution
 - Input R&R fiscal data into IFMIS
 - Development of fiscal reports
 - Personnel actions and tracking
 - Property accountability during R&R operations
 - Coordination of Community Disaster Loans and State Share Loans.
 - Correspondence Team
 - Handling of all Congressional, White House, and general public correspondence
 - Coordination of IG and GAO reports and audits.

- Strategic Planning and Evaluation Team
 - Implementation of GPRA requirement in R&R operations
 - Design of R&R evaluation systems (e.g., setting standards, data analysis, data base design, corrective actions)
 - Design and administration of surveys (including customer service surveys)
 - Design and management of After Action reports.
- Federal Disaster Declaration Policy and Processing Team
 - Support the Director in such areas as Declarations, Turndowns, Appeals, Cost-Share Adjustments, and Requests for Program/Policy Clarifications
 - Manage the disaster declaration process.

Recovery Activities

- **The Human Services (HS) Division has the mission to ensure that individuals and families that have been affected by disasters have access to FEMA's Human Services Programs in a timely manner** and that the best possible level of service is provided to applicants in the administration of these programs. This business function includes: developing partnerships and exchanging information with the States, voluntary organizations, the private sector, and other Federal agencies that are delivering similar assistance. From a FEMA IT perspective, the Human Services Division is a major user of NEMIS, and the HS information flow requirements supported by NEMIS are large. The Human Services Division consists of the Program Guidance and Implementation Branch and three National Processing Service Centers (NPSC) in Texas, Maryland, and Virginia. With NEMIS support, the Program Guidance and Implementation Branch administers a broad spectrum of human services programs including:
 - Individual and family grant programs
 - Disaster housing program
 - Crisis counseling program
 - Stress management program
 - Disaster unemployment assistance
 - Disaster legal services
 - Cora Brown Fund
 - 403 Audit Program
 - Donations Management Program.

The Program Guidance and Implementation Branch is also responsible for: coordinating benefits to ensure that there is no duplication, interpreting applicable laws, developing business rules, and providing regulations and instructions to field offices.

- **Within the Human Services Division, the three National Processing Service Centers provide: tele-registration services, eligibility determinations, benefits processing, and helpline support.** The NPSCs help victims begin the process of recovering from disasters. The human services support includes: answering calls promptly, listening compassionately, recording data carefully, providing accurate information to callers, and ensuring timely and accurate transmission of callers' data to assistance providers. NEMIS is an integral part of this human services support capability. For example, NEMIS provides a set of screens and a user interface. Data capture is accomplished through an interview process with victims. Within NEMIS, automated eligibility determinations are made through application of a comprehensive set of business rules associated with the Individual and Family Grant and Disaster Housing Program. NEMIS has also developed automated and portable methods of inspection in the field including assessments of damage, which feed the benefits

determination process. NEMIS also provides a set of rules and data base for *National Flood Insurance Reform Act (NFIRA)* compliance checking, as well as interfaces to the Small Business Administration (SBA) for loans processing.

Each of the NPSCs also serves as a Center of Excellence. Texas is the Center of Excellence for Call Center Systems and provides policy for the tele-registration process. Maryland serves as the Center of Excellence for applicant claims processing, including systems improvements and automation for benefits processing. Virginia is the Center of Excellence for Customer Services/Innovation and also administers inspection service contracts.

- **Within the R&R Directorate, the Infrastructure Division conducts Public Assistance (PA) activities related to the repair or rehabilitation of qualifying public and certain private non-profit facilities.** With its comprehensive Infrastructure Support (IS) module, NEMIS provides an omnibus approach to manage FEMA's Infrastructure recovery programs. In particular, the reader is referred to the NEMIS *Functional Description* and *System/Subsystem Specification* for details of this comprehensive support capability. Data elements for Infrastructure Support are defined in the NEMIS logical and physical data model, described in more detail in Section 1.12.5. The following are some of the key features of NEMIS Infrastructure Support capability:
 - NEMIS supports inspectors in the field in the automated capture and submission of the Preliminary Damage Assessment (PDA) and associated cost estimates to repair. The NEMIS approach and data model support geographical pinpointing of inspection data at GPS accuracy levels. NEMIS provides a mechanism to enter this data into a GIS, to manage it, and to make it available for downstream re-use across the enterprise.
 - NEMIS provides comprehensive ability to create, manage, and use Disaster Survey Reports (DSRs). For example, NEMIS includes a digital library ability to associate incoming documents and data with case folders and databases. As the NEMIS project progresses, there will be tighter integration with the FEMA GIS data base.
 - NEMIS affords the applicant and Regional Offices with maximum visibility into infrastructure recovery efforts through remote access to appropriate and applicable data bases. In this regard, NEMIS also supports briefings, distributed collaboration activity, tele-conferencing, and report generation.
 - NEMIS supports routing and distribution of IS recovery files and data to appropriate authorities and action officers.
 - NEMIS has been developed and integrated using automated workflow methodologies to support infrastructure recovery processes including: initiation activity, damage assessment, cost estimating, electronic document and data submission, document and data base development and maintenance, review of documents and data sets, allocation and obligation of resources, tracking and reporting of response activities, and closeout processes.
- **The R&R Directorate develops and manages programs that provide funding assistance to State and local governments, as well as to families and individuals.** Some of the recovery activities can be prolonged as exemplified by R&R's establishment of the Northridge Earthquake Long-Term Recovery Area Office as a special project. The R&R Directorate manages a number of disaster-related grant programs under public law. As with the Mitigation Directorate, the PT&E Directorate and the Regional Offices, the R&R Directorate could benefit from a well-integrated, enterprise-wide Grants Management System.